

CLAIMS

1 1. A method for transferring data on a network from a data source
2 to an end station executing a multi-layer network protocol, including a network
3 layer and at least one higher layer, through a network interface on the end
4 station, comprising:

5 receiving in the network interface a packet which carries a data payload
6 from a block of data in the data source, and a control field identifying the
7 packet;

8 determining based on the control field in the network interface whether
9 the packet matches a flow specification, and if so transferring the data payload
10 in the packet directly to a target buffer assigned by a process at a layer higher
11 than the network layer.

1 2. The method of claim 1, wherein the control field in the packet
2 includes a packet header.

1 3. The method of claim 1, wherein the network protocol comprises
2 TCP/IP, and the packet control field comprises a TCP/IP header.

1 4. The method of claim 1, including prior to receiving the packet,
2 allocating the target buffer for the plurality of packets, and notifying the
3 network interface of the allocated target buffer.

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1 5. The method of claim 1, the network interface is coupled to a
2 network medium supporting a maximum packet size, and including transmitting
3 a request from an application for transfer of a block of data from the data
4 source, the block of data having a length potentially greater than the maximum
5 packet size for the medium.

1 6. The method of claim 5, including notifying the network interface
2 in response to the request of a flow specification for the block of data according
3 to the multi-layer network protocol, and wherein the step of receiving the packet
4 includes identifying packet using the flow specification.

1 7. The method of claim 6, wherein the network protocol comprises
2 TCP/IP, and the flow specification includes a sequence number of a first byte
3 from the plurality of packets to be stored in the target buffer.

1 8. The method of claim 1, wherein the flow specification includes
2 a sequence number for the block of data.

1 9. The method of claim 8, wherein the flow specification includes
2 IP source and destination addresses and TCP port numbers.

1 10. A method for transferring data on a network from a data source
2 to an end station executing a multi-layer network protocol through a network
3 interface on the end station, including medium access control layer processes,
4 comprising:

5 establishing a connection with a destination for a session according to
6 the network protocol;

7 transmitting a request for transfer of a block of data from the data
8 source, and providing a flow specification and an identifier of a target buffer to
9 the network interface;
10 receiving in the network interface a plurality of packets which carry
11 respective data payloads, packets in the plurality of packets including control
12 fields identifying whether the packet falls within the flow specification of the
13 block of data,
14 upon receiving a packet, determining in the network interface whether
15 the packet falls within the flow specification, and if so
16 transferring the data payload to the target buffer.

1 11. The method of claim 10, wherein the control field in the first
2 packet includes a packet header.

1 12. The method of claim 10, wherein the network protocol comprises
2 TCP/IP, and the packet control data comprises a TCP/IP header.

1 13. The method of claim 10, wherein the network protocol comprises
2 TCP/IP, and the flow specification includes a sequence number of a first byte
3 from the plurality of packets to be stored in the target buffer.

1 14. The method of claim 10, wherein the flow specification includes
2 a sequence number for the block of data.

1 15. The method of claim 14, wherein the flow specification includes
2 IP source and destination addresses and TCP port numbers.

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1 16. A method for transferring data on a network from a data source
2 to an end station executing a TCP/IP network protocol through a network
3 interface on the end station including medium access control layer processes
4 below TCP/IP, comprising:
5 establishing a connection with a destination for a session according to
6 the TCP/IP network protocol;
7 transmitting a request from the application, for transfer of a block of data
8 from the data source, and providing a flow specification for the block of data
9 and an identifier of a target buffer to the network interface;
10 receiving in the network interface a plurality of packets which carry
11 respective data payloads from the block of data in the data source, and each
12 packet in the plurality of packets including a TCP/IP header,
13 upon receiving each packet, determining in the network interface
14 whether the packet falls within the flow specification, and if so
15 transferring the data payload to the target buffer.

1 17. The method of claim 16, wherein the flow specification includes
2 a sequence number for bytes of data in the block of data.

1 18. The method of claim 17, wherein the flow specification includes
2 IP source and destination addresses and TCP port numbers.

1 19. The method of claim 16, wherein the target buffer comprises a
2 buffer assigned at the TCP layer or higher.

1 20. The method of claim 16, wherein the target buffer comprises a
2 buffer assigned at a layer higher than the TCP layer.